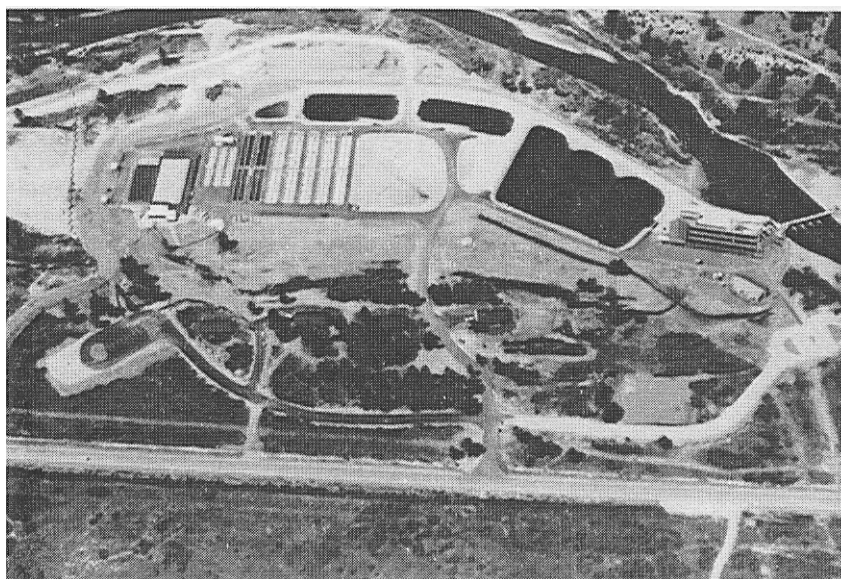




## **SAWTOOTH FISH HATCHERY AND EAST FORK SATELLITE**

1992 SPRING CHINOOK BROOD YEAR REPORT  
1993 STEELHEAD BROOD YEAR REPORT



by

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## **1992 SPRING CHINOOK SALMON**

### **ABSTRACT**

The Sawtooth Fish Hatchery (SFH) trap and weir were put into operation on May 28, 1992, and operated through September 18, 1992. A total of 387 spring chinook salmon (196 males, 165 females, and 26 jacks) were trapped. Released above the weir were 142 fish (77 males, 56 females, and 12 jacks) to spawn naturally. Prespawning mortality of ponded fish totaled 5 fish and included 2 males and 3 females for a 2.0% prespawning mortality rate.

Spawning began on August 10 and continued through September 8, with ten spawning days total. We spawned 104 females, 117 males, and 14 jacks for 468,300 green eggs (4,500 eggs/female), which yielded 423,600 eyed eggs for an eye-up rate of 90.5%. From these eyed eggs, 441,812 fry were ponded, which resulted in a smolt release of 213,830 smolts.

The East Fork satellite fish trap and velocity barrier were put into operation on June 1, 1992 and was operated through September 8, 1992. A total of 65 spring chinook salmon (38 males, 13 females, 14 jacks) were trapped with 40 fish (25 males, 6 females, 9 jacks) being released to spawn naturally. No prespawning mortality occurred.

Spawning at the East Fork started August 6 and continued through September 4, 1992, with five spawning days. A total of 13 males, 5 jacks and 7 females were spawned, yielding 30,500 green eggs, for a fecundity rate of 4,357 eggs/female. These green eggs resulted in 28,200 eyed eggs for an eye-up rate of 92.4%. From these eyed-eggs, we ponded 25,311 fry that were reared at Sawtooth with 12,368 smolts planted in the East Fork in April 1994.

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## **INTRODUCTION**

### **Funding Source**

Sawtooth Fish Hatchery (SFH) is part of the Lower Snake River Compensation Plan and has been in operation since 1985. The hatchery and satellite facility was built by the Corp of Engineers and is funded through the U.S. Fish & Wildlife Service.

### **Location**

The SFH is located five miles south of Stanley, ID. The facility's 71 acres borders the Salmon River to the west, Highway 75 to the east, and US Forest Service ground to the south and north. The Sawtooth weir is roughly 400 miles from Lower Granite Dam and 950 miles from the mouth of the Columbia River. Chinook are released directly into the river at the hatchery and above the hatchery in the headwaters of the Salmon. Sawtooth steelhead are released at the hatchery, along the lower Salmon, and various other drainages around the state.

The SFH has operated a satellite facility on the East Fork of the Salmon River since 1984. The facility is situated 18 miles upstream on the East Fork Salmon River. The mouth of the East Fork Salmon River is located 42 miles downriver from SFH. The property was purchased from the Bureau of Land Management and is surrounded by private land. An access road easement was purchased from a private landowner who has property surrounding the location. The east side of the property borders the East Fork of the Salmon River. Historically, all East Fork fish have been returned to the East Fork River.

### **Species Reared**

The SFH is involved in trapping, spawning and rearing spring chinook salmon to the smolt stage for release. A-run steelhead trout are also trapped and spawned. The steelhead eggs are incubated to eye up then transferred to other hatcheries for rearing.

The East Fork facility handles spring chinook salmon as well as B-run steelhead trout. The green eggs from fish spawned at the East Fork station are transferred to SFH for incubating. The chinook are reared at SFH with the steelhead being transferred as eyed eggs to other hatcheries for rearing.

### **Broodstock History**

Historically, all of the SFH and the East Fork trap broodstocks have come from the upper Salmon River and the East Fork River, respectively. There was some introduction of Rapid River stock at the Sawtooth site and in the headwaters of the Salmon River in the late 1970s and early 1980s as fry and smolt plants.

At both facilities returning adult fish are released to spawn naturally. At SFH about one-third of the steelhead and salmon are released while one-half are released at the East Fork. A historical synopsis of releases and returns is shown in Appendix A.

Both facilities have been relatively disease-free, although Sawtooth and East Fork chinook have had a high incidence of Bacterial Kidney Disease (BKD) and a minor incidence of *Myxobolus*

*cerebralis* (whirling disease). The incidence of BKD is being reduced by feeding and injecting Erythromycin and by segregating high BKD parents' progeny from the rest of the population. This segregation starts at the eye up stage and continues until release (smolt stage). Whirling disease is reduced by keeping the fry on well water for as long as possible before moving them outside on river water.

## **OBJECTIVES**

### **Mitigation Goals**

As part of the Lower Snake River Compensation Plan, SFH's mitigation goals are expressed in adult returns of 19,000 adult salmon above Lower Granite Dam.

### **Idaho Department of Fish and Game's Objectives**

Idaho Department of Fish and Game's objectives are:

1. To produce 2.4 million smolts for release, of which up to one million of the East Fork-origin smolts will be returned to the East Fork of the Salmon River.
2. Produce quality fish for supplementation programs.
3. Implement research programs at the hatchery to improve returns to the hatchery.

## **FACILITY DESCRIPTION**

### **Hatchery Description**

The hatchery's main building is 134 ft x 166 ft and consists of an office, meeting room, lab, visitor/interpretive center, wood shop, welding/fabrication shop, intake collection box/chemical room, shop office, incubation and early rearing room, one inside storage room and two outside covered storage areas, generator room, furnace room and a feed freezer/chemical equipment room. The hatchery has four pump houses (each is 14 ft x 11 ft), of which one is for domestic water and three are production wells. An intake building (15 ft x 37 ft) is located one-half mile upstream from the hatchery and Salmon River water is collected for outside production rearing. The temporary employee dorm and adult spawning facility are located 300 yards downstream of the hatchery building. The dorm (38 ft x 72 ft) has three bedrooms with a bath in each, attached public rest-room facilities, storage and laundry room, living and dining room with an open kitchen. The adult facility consists of three adult ponds and an enclosed spawning shed (35 ft x 52 ft). There are five resident houses at SFH, all about 1,360 sq ft with attached single car garages and separate wood sheds.

The East Fork has a roof structure over a 28 ft travel trailer that is used as a residence while the trap is in operation. The other building is a combination shop, storage and spawning shed (22 ft x 44 ft).

## **Production Capabilities**

Production capacities at the East Fork trap consists of two 68 ft x 10 ft x 4.5 ft adult holding ponds or 3,060 cubic feet (cf) and a 10 ft x 17 ft fish trap. No fish are reared at this facility. All green eggs are shipped to SFH.

Production capacities for SFH include 100 stacks of FAL incubators containing 800 trays with the potential to incubate five million chinook eggs or seven million steelhead eggs. The 16 inside rearing vats have a total volume of 480 cf and a capacity for 100,000 fry each; outside rearing consists of 12 fry raceways each with 750 cf of rearing space and 28 production raceways each with 2,700 cf of rearing space. Each production raceway has a capacity to raise 100,000 chinook to smolt stage for a total capacity of 2.8 million fish. These production raceways are serial reuse that flow from an upper raceway to a lower one.

The adult facility has three concrete adult fish holding ponds with 4,500 cf of holding area. Each pond can hold approximately 1,300 adults.

## **RECOMMENDATIONS**

Recommendations for SFH include developing additional wells for disease-free rearing water, modifying the river water intake to reduce winter icing problems, re-siding the hatchery buildings, and seal coating the roadways.

East Fork recommendations include developing separate holding ponds for smolt acclimation and modifying the intake screen to exclude fish fry and modifying the velocity barrier to prevent injury to migrating fish.

## **WATER SUPPLY**

### **Source**

The SFH receives fish culture water from the Salmon River and two production wells. Rearing water from the river enters an intake structure located one-half mile upstream from the hatchery building, and flows through a 54-inch pipe to a control box located in the hatchery building for final screening. This water is then distributed to the indoor vats, outside raceways, or adult fish facility. Incubation and early-rearing water is provided by two production wells. Excess well water is spilled into the control box for use in the outside raceways. A third well provides tempering water introduced at the river intake to reduce winter icing problems.

The East Fork trapping site receives water from the East Fork of the Salmon River via gravity-flow piping throughout the holding ponds. No fish are reared there.

### **Quantity and Temperature**

The wells provide 7.8 cfs of pumped water and temperatures range from 39°F (4°C) in the winter to 52°F (11°C) in the summer. The river provides up to 55 cfs of gravity-flow water and ranges in temperature from 32°F (0°C) in the winter to 68°F (20°C) in the summer (Appendix B).



## **Water Quality**

The last water quality analysis from the collection box at the river was completed in June 1993. Results include: hardness at 68 mg/L; total alkalinity as CaCO<sub>3</sub> at 74; bicarbonate alkalinity as CaCO<sub>3</sub> at 74; specific conductance at 157 (umhos/cm); total ammonia as N at 0.043 (mg/L); total NO<sub>2</sub> + NO<sub>3</sub> as N at 0.073; total Kjeldahl N as N at <0.05 (mg/L); total phosphorus as P at <0.05 (mg/L); ortho phosphate as P at 0.019; and pH at 8.0. The most noticeable variances from the 1985 tests were: ortho-phosphate, which was <.003 mg/l in 1985 to .019 mg/l in 1993 and iron, which was 120 ug/l in 1985 to 20 ug/l in 1993. Additional information is shown in Appendix C.

## **STAFFING**

Five permanent personnel are stationed at SFH: Hatchery Manager II; Assistant Hatchery Manager; Utility Craftsman; and two Fish Culturists.

The temporary employee staffing includes; 8 months of Fishery Technician time, 42 months of Biological Aide time, and 27 months of Laborer time.

## **FISH HEALTH**

### **Diseases Encountered and Treatment**

A serious epizootic of apparent mycotic nature accounted for a 53% loss of fish . Increases in mortality were noted after each stressful event. The commencement of mortality was associated with spring adipose clipping and then immediately moving these fish from well water to river water. Shortly after these events, the Eagle laboratory isolated two species of bacteria (*Aeromonas hydrophila* and *Aeromonas sobria*). *A. hydrophila* was susceptible to Oxytetracycline (OTC), but the *A. sobria* was resistant to OTC. Both isolates were susceptible to Erythromycin treatment. After a treatment of OTC (with no effect) the second Erythromycin treatment was applied on schedule. As the Erythromycin treatment was in process, mortalities dropped to near normal rates. With each subsequent stressful event mortalities and the incidence of "fuzzy-tail" would rise. Mortalities peaked in December and January of 1993-94.

Several programs have been implemented at SFH to help raise a better quality smolt. Outside raceway baffles were tested with two raceways and shade-cover was installed on all the outside raceways. A BKD segregation program was implemented at this hatchery in 1989, with apparent success in limiting mortalities to high BKD raceways (91-153 & 91-154).

Important pathogens found at SFH are *Renibacterium salmoninarum* (BKD), *Myxobolus*, *Diplostomum spp.* (eye fluke), and *Cytophaga psychrophilia* (Cold Water Disease). Both *Myxobolus* and *Diplostomum* have been controlled with concrete raceways. Although *Cytophaga* is ubiquitous in the environment, Cold Water Disease is not expressed at this hatchery unless stressful conditions predispose the fish to disease (Appendix D).

In times of warm water temperatures or handling, some fish will show the typical signs of this disease. The focus of the fish health program at SFH is control of BKD.

In 1992, protocols stated in the Investigative New Animal Drug (INAD) 4333 for SFH call for a 21-day treatment for production fish and 28-day treatment for high BKD segregation groups. In the future, Erythromycin feeding strategies will include protocols which might enhance absorption of the drug.

## **FISH PRODUCTION**

### **Spring Chinook Adult Collection**

The SFH chinook trapping season began on May 28, 1992 and continued through September 8, 1992. The peak of the run occurred during the first and second week of July (Appendix E). A total of 387 spring chinook salmon were trapped including 196 males, 165 females, and 26 jacks (Appendix F). Released above the weir were 145 salmon which included 77 males, 12 jacks, and 56 females (Appendix G). The other two-thirds of the run was held at the hatchery for egg collection. Tagged fish recoveries included 34 adipose-fin (AD) clips and 2 right ventral (RV) clips.

The East Fork trap was in operation from June 1, 1992 to September 8, 1992. East Fork's run peaked the third week of August (Appendix H). The East Fork facility trapped 65 spring chinook salmon of which there were 38 males, 14 jacks, and 13 females (Appendix F). Released above the weir were 40 salmon including 25 males, 9 jacks, and 6 females (Appendix G). East Fork had one AD-clipped fish return.

At SFH there was a male:female ratio of 57% males and 43% females. The East Fork's male:female ratio was 80% male and 20% female.

Recoveries of the Coded-Wire Tagging (CWT) indicated one three-year old, 18 four-year old, and 5 five-year old fish returned to SFH. The lone East Fork CWT recovery indicated a four-year old fish.

### **Adult Treatments**

The SFH and East Fork adult chinook were injected with Erythromycin phosphate at a rate of 20 mg active/kg body weight; injections were given in the dorsal sinus. The SFH ponded adults were treated three times/wk in a one-hour 175 ppm formalin flush. The East Fork ponded adults were treated with the same flush at a 100 ppm rate.

### **Prespawning Mortality**

The SFH had five pre-spawning mortalities of ponded fish for a 2.0% mortality rate. A total of 2 males and 3 females died prior to spawning at SFH. East Fork had no pre-spawning mortality.

### **Spawning Operations**

Spawning activities at SFH began August 6 and concluded September 8, 1992. The ten egg takes during this period yielded 468,300 green eggs from 104 females for an average fecundity of 4,503 eggs/female. There were 119 male and 14 jack salmon used for fertilization. Each female's eggs were separated into half and fertilized by two separate male salmon. Then the eggs were

recombined and water hardened for one hour in a 100 ppm titrate able iodine solution. The eggs were then put into Heath incubator trays, with one female/tray for BKD segregation.

Spawning activities at the East Fork fish trap began August 6 and concluded September 4, 1992. The six egg takes during this period yielded 30,500 green eggs from seven females for an average fecundity of 4,357 eggs/female. There were 13 male and 5 jack salmon used for fertilization. Each female's eggs were separated into a third and fertilized by three separate male salmon. The eggs were combined and water hardened for one hour in a 100 ppm titrate able iodine solution, then transported to SFH to be put into Heath incubator trays, with one female/tray for BKD segregation.

At SFH, 10 spawned females had a high incidence of BKD while one spawned female at East Fork had high incidence of BKD. All of the SFH high incidence BKD eggs were reared isolated from the production eggs. The high incidence BKD East Fork eggs were combined with the other East Fork eggs. The East Fork group was treated as if all were high incidence BKD.

### **Incubation**

Each eight-tray Heath stack had flows set at five gpm of well water. Eggs were put away at one female/tray for BKD segregation. This averaged about 45 oz or approximately 5,200 eggs/tray. All incubated eggs were treated with a 1,667 ppm formalin bath for 15 minutes starting three days after fertilization at five times/wk for fungal control.

Well temperatures ranged from 50°F to 41°F during the incubation period. The eggs eyed-up around 480 thermal units (TU). At eye-up the eggs are shocked by dropping them from one container to another, picked with an electronic sorter, and enumerated with an electronic counter. The eggs are shocked around 530 TU and hatch around 1,300 TU.

The SFH green eggs eyed up at a 90.5% rate, yielding 423,600 eyed eggs. East Fork green eggs eyed up at a 92.4% rate, yielding 28,200 eyed eggs. (Appendix I)

### **Early Rearing**

The swim-up fry were kept at a high density during feed training (1.2 lbs/cf) until all the fish were on feed. After all the fish were eating well, rearing volumes were increased and densities decreased to 0.15 lb/cf. The fingerlings were moved to the final rearing raceways when densities began to approach 0.8 lb/cf.

The swim-up fry were transferred from the Heath trays to epoxy-painted cement vats for early rearing in December through mid-January. The vats contained PVC baffles every four feet. The vats are 4 ft wide x 3 ft deep x 40 ft long, with key- ways to allow lengths of either 10 ft, 20 ft or 40 ft, thus creating rearing volumes of 120, 240, or 480 cf.

Starting flows for the swim-up fry were set at 20 gpm/vat. As the fish grew, the flows were increased to a maximum of 110 gpm. Early rearing well water varied in temperature from 44°F at swim-up to 40°F when the fish were moved to the final rearing raceways.

All fry were started on Bioproducts BioDiet Starter #1 and #2. Feed amounts and sizes varied according to manufacturers recommendations as the fish grew. All fish were fed a prophylactic treatment of Erythromycin during March at a rate of 4.5 grams active/100 lb of fish (Appendix J).

The fish were transferred to the final rearing raceways around 150 fpp, during late May and early June.

### **Final Rearing**

The outside raceways are cement, measuring 12 ft wide x 2.3 ft deep x 100 ft long, yielding 2,700 cf of rearing space. Starting densities outside averaged 0.15 lb/cf. Initial flows were set at 500 gpm/raceway and increased to 1,000 gpm during the summer. River water supplies the outside raceways, so daily temperatures fluctuate up to 19°F. Seasonal variances range from lows of 32°F during winter to 69°F in summer.

All outside fish were fed a diet of Bioproducts Grower feed with a 21-day prophylactic treatment of Erythromycin at a rate of 4.5 grams active/100 lb of fish to prevent the onset of BKD. The high BKD fish were fed a 28-day treatment of Erythromycin.

A natural rearing study was implemented to quantify any differences in fish growth or behavior between natural reared or traditional reared fish. A natural raceway is a raceway with baffles spaced every ten feet and covered with plastic mesh shading.

The finish weight of all BY92 spring chinook smolts reared at SFH was 9,419 lb. The fish were fed 29,543 lb of feed for a conversion of 3.3. The unusually high mortality accounts for the high conversion.

### **Fish Marking**

Fish marking occurred during mid-May 1993. There were 467,123 fish marked. The SFH stock had 221,892 reserve group fish that received CWT with an AD-fin clip, 190,967 supplementation fish received an LV-clip, and 42,577 high-BKD fish only an AD-fin clip. The 25,311 East Fork fish were RV-fin clipped. The fish marking crew returned in September to Passive Integrated Transponder (PIT) tag 5,001 fish. Any returning SFH adults with an LV denoting supplementation fish will be released to spawn naturally. The PIT tags are to evaluate downriver migration. A summary of marking is shown in Appendix K and detailed further in Appendix L.

### **Fish Distribution**

Fish release for SFH stock BY92 smolts occurred in April 1994. There were 72,300 supplementation smolts at 25 fpp released April 9 in the headwaters of the Salmon River. There were 141,530 reserve group smolts released April 9 to 13 at the SFH weir. The reserve fish were an attempt at a volitional release. About 40% of the reserve smolts emigrated from the raceways before the boards were pulled and the remaining fish flushed into the river on April 13, 1994.

The 12,368 East Fork stock BY92 smolts were released ten miles above the fish trap on April 8, 1994. A summary of all the smolt releases is shown in Appendix L.

## **1993 STEELHEAD TROUT**

### **ABSTRACT**

The Sawtooth Fish Hatchery (SFH) trap and weir were put into operation on March 18, 1993 and closed May 12, 1993. A total of 1,591 adult steelhead (1,154 males and 437 females) were trapped at the SFH weir. A total of 668 steelhead were released above the hatchery to spawn naturally. This included 490 males (3 natural) and 178 females (4 natural). There was no prespawning mortality at SFH.

Spawning began on April 8 and continued through May 13, with 11 spawning days occurring. A total of 255 females were spawned at SFH, yielding 1,131,877 green eggs for an average fecundity of 4,439 eggs/female. These green eggs resulted in 1,031,635 eyed eggs for an eye-up percentage of 91.1%. The eggs were shipped to Hagerman National Hatchery for rearing.

The East Fork velocity barrier and trap was put into operation March 30, 1993 and ran through May 12, 1993. A total of 176 adult steelhead were trapped. This included 99 males and 77 females. Fish released above the weir to spawn naturally included 42 males (8 natural) and 34 females (9 natural).

Spawning operations began on April 8, 1993 and continued through May 13, 1993 with seven spawning days occurring. Forty-three females were spawned, yielding 211,993 green eggs, for an average fecundity of 4,930 eggs/female. These green eggs resulted in 178,925 eyed eggs for an 84.4% eye-up rate. These eggs were shipped to Magic Valley Hatchery for rearing.

An additional 4,729,711 green eggs from Pahsimeroi Hatchery were incubated at SFH. These eyed up at a 89% rate, yielding 4,211,087 eyed eggs, and were shipped to the following hatcheries: Magic Valley received 1,264,925, Niagara Springs received 927,451, and Hagerman National received 2,027,035. Fry were also planted by SFH personnel in the following lakes: Magic Reservoir received 390,000 and Mormon Reservoir received 150,000.

The SFH and East Fork stock eyed eggs were released as smolts during the spring of 1994. The SFH stock smolts were released at the following locations: SFH acclimated release 711,052; SFH direct release 61,321; Salmon River/Bruno's 182,083. East Fork stock smolts numbering 160,060 were released upriver of the East Fork satellite facility. An additional 357,140 Dworshak smolts were released below the weir site.

## **FISH PRODUCTION**

### **Steelhead Adult Collection**

The SFH weir and trap was put into operation on March 18, 1993 and closed May 12, 1993. The East Fork trap was put into operation March 30, 1993, and ran through May 12, 1993. The peak of the SFH run occurred during the first and second week of April, while the peak of the East Fork run occurred during the second week of April (Appendices M, N ).

A total of 1,591 adult fish were trapped at SFH, which included 1,154 males and 437 females (Appendix O), of which 164 of these fish had LV or RV clips; 65 of the clipped fish had tags. A total of 668 steelhead (490 males and 178 females) were released above the weir to spawn naturally. All natural fish (3 males and 3 females) were released, along with enough hatchery fish to equal two-thirds of the total run, as stated in National Marine Fisheries Service (NMFS) rules. The other one-third of the run was artificially-spawned at the hatchery.

The East Fork facility trapped 176 adult fish, of which 99 were males and 77 were females (Appendix O). A total of 42 males (8 natural) and 34 females (9 natural) were released above the velocity barrier to spawn naturally. All natural fish were released, along with enough hatchery fish to equal one-half of the total run. The other half of the run was artificially-spawned at the facility. East Fork had 58 clipped fish return, with 36 of these fish having tags. The length frequency distribution of steelhead from SFH and the East Fork is shown in Appendices P and Q and Appendices R and S, respectively.

The SFH had a male:female ratio of 62% males and 38% females. The East Fork's male:female ratio was 56% male and 44% female.

Using Kent Ball's (IDFG Anadromous Researcher) lengths for 1 and 2-ocean fish, steelhead returns by year class and sex are shown in Appendix T.

From the 65 SFH CWT-fish recovered, the information indicated 2 were four-year olds, 8 were three-year olds, and 55 were two-years old. From the East Fork 35 CWTs recovered, 25 were four-year olds, one was a three-year old, and 9 were of unknown origin. Released steelhead by adult year class and sex are shown in Appendix U.

### **Adult Treatments**

The returning adults at SFH and East Fork satellite are not treated or injected with any type of drug or chemicals prior to spawning.

### **Prespawning Mortality**

The East Fork facility and SFH had no pre-spawning mortality.

## **Spawning Operations**

Steelhead were spawned at SFH on 11 different days: April 5, 8, 12, 15, 19, 22, 26, 29, May 3, 6, 1993. Spawning took place seven times at the East Fork: on April 8, 12, 15, 19, 22, 26, and 29, 1993. Both facilities used two males/female, pooling the males' sperm, then combining it with the female's eggs.

At SFH, 785 fish were spawned, of which 255 were females and the East Fork facility spawned 100 fish, of which 43 were females. Using the Von Bayer egg-enumeration method, 1,131,877 green eggs were collected from SFH fish (4,439/female) and 211,993 green eggs were taken from East Fork fish (4,930/female).

After fertilization, the eggs were rinsed of blood and sperm with well water. Then the eggs were hardened in a minimum 100 ppm solution of Argentyne (10% iodine) solution for one hour before being put into Heath trays for incubation. Two female's eggs were pooled into each tray. After viral test results were received, viral-positive eggs were culled.

## **Incubation**

After hardening in an Argentyne solution, the green eggs were put away at two females/Heath tray. Initial water flow was set at 4 g.p.m. of well water/stack and increased to 5 gpm at eye-up.

An additional 4,729,711 green eggs were received from Pahsimeroi Hatchery and incubated at SFH. These eggs were incubated at two females/Heath tray.

All incubated eggs were treated with a 1,667 ppm 15-minute formalin bath five times/week for fungal and bacterial control. The SFH's eggs eyed up at a 91.1% rate, yielding 1,031,635 eyed eggs; East Fork's eggs eyed up at a 84.4 % rate, yielding 178,925 eyed eggs; and Pahsimeroi eggs incubated at SFH eyed up at a 89% rate, resulting in 4,211,087 eyed eggs. (Appendix V)

Well temperatures varied from 39°F at the beginning of incubation to 44°F at the end of incubation. Seven TU/day was the average during the incubation period. Eye-up occurred around 360 TU and the eggs were shocked at 380 TU.

The eggs were shocked by putting them in a three-gallon bucket half full of water, then poured into a quarter-full bucket of water from about three feet high. One day after shocking, the eggs were machine-picked, using a Jenn-Sorter model JH machine, which picks and enumerates eggs. A day or two after picking, the eyed eggs are hand-picked before transfer to the rearing hatcheries. The eggs were loaded at 50,000 to 100,000 eggs in a 48-quart cooler of well water, the cooler was then strapped shut and shipped.

Personnel from SFH shipped 1,182,500 SFH eggs to Hagerman National Hatchery and Magic Valley Hatchery received 135,200 East Fork eggs. The Pahsimeroi eggs were shipped as follows: 1,264,925 to Magic Valley Hatchery; 2,027,035 to Hagerman National Hatchery; and 927,450 to Niagara Springs Hatchery.

## **Release Acclimation of BY 93**

For the third year in a row, steelhead smolts were held at SFH Hatchery before final release. A total of 711,913 smolts from Hagerman National Hatchery were held in 13 separate raceways,

starting April 14, 1994. They were held from 8 to 17 days. Mortality was much lower (.12%) than the two previous years (0.65% and 0.7%). The fish were fed a maintenance diet of Rangen's Salmon Grower. The screens were removed starting April 25, with 5% to 10% of the smolts moving out on their own. The fish were forced out of the raceways April 29. This year there was no high water to help pull the fish downriver. The majority of the smolts were still in the SFH weir pool two weeks after release.

### **Fish Marking**

Fish marking was completed in the rearing hatcheries and is shown in Appendix L.

## **CONCLUSION/RECOMMENDATIONS**

### **East Fork Trap**

As stated in last year's brood year report, the East Fork's adult returns are insufficient to meet egg needs or escapement goals. With the involved agencies' approvals, a lower weir and trap would boost our facility's adult numbers by capturing all the fish that drop out before reaching the trap. Another option would be not to clip the adipose fin of East Fork stock fish. A ventral fin could be clipped off to identify these fish as East Fork stock. With the adipose fin attached, the East Fork stock would not be fished upon, giving us more broodstock potential. This would allow us to plant less Dworshak stock smolts, which are proven to much less successful than East Fork stock.

### **Sawtooth Fish Hatchery**

If the returning number of adults show that acclimation is a viable program, then we should plan on implementing the program every spring. But if the number of adults shows there is no difference or less returning "acclimated" adults, then we need to stop the program. Acclimation requires the hatchery to draw large amounts of water from the river, which also draws in emerging endangered natural chinook fry. The less water the hatchery uses during the spring, the less fry we pull across our head box screen.



## **APPENDICES**

## Appendix A. Sawtooth Hatchery and East Fork Chinook Smolt Releases and Adult Returns.

### Sawtooth Fish Hatchery

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>			Total Returns	%
			3-year	4-year	5-year		
1979	1981	None	-	-	291	-	inc.
1980	1982	None	17	66	165	248	inc.
1981	1983	185,375	49	1,182	796	2,027	1.08
1982	1984	230,550	292	922	875	2,086	.91
1983	1985	420,060	51	452	1,318	1,821	.43
1984	1986	347,484	17	86	190	293	.08
1985	1987	1,185,061	80	286	164	530	.05
1986	87-88	1,705,500	412	1,212	297	1,921	.11
1987	88-89	2,092,000	112	201	63	376	.02
1988	89-90	1,895,600	68	496	480	1,044	.055
1989	90-91	652,600	45	78	27	150	.023
1990	91-92	1,273,400	29	63	(1995)	-	inc.
1991	92-93	774,583	6	(1995)	(1996)	-	inc.
1992	93-94	213,830	(1995)	(1996)	(1997)	-	inc.

### East Fork Chinook

Brood Year	Release Year	Number Released	Adult Returns <sup>a</sup>			Total Returns	%
			3-year	4 -year	5-year		
1979	1981	-	-	-	69	69	inc.
1980	1982	-	-	26	59	85	inc.
1981	1983	-	-	193	102	317	inc.
1982	1984	-	-	87	181	268	inc.
1983	1985	-	22	90	519	631	inc.
1984	1986	108,700	1	23	51	75	.06
1985	1987	195,100	6	55	27	88	.045
1986	1988	249,200	22	106	32	160	.064
1987	1989	305,300	12	23	23	58	.019
1988	1990	514,600	7	27	65	99	.019
1989	1991	98,300	15	18	13	46	.046
1990	1992	79,300	6	2	(1995)	-	inc.
1991	1993	35,172	0	(1995)	(1996)	-	
1992	1994	12,368	(1995)	(1996)	(1997)	-	inc.

<sup>a</sup> Age classes based upon the following lengths:

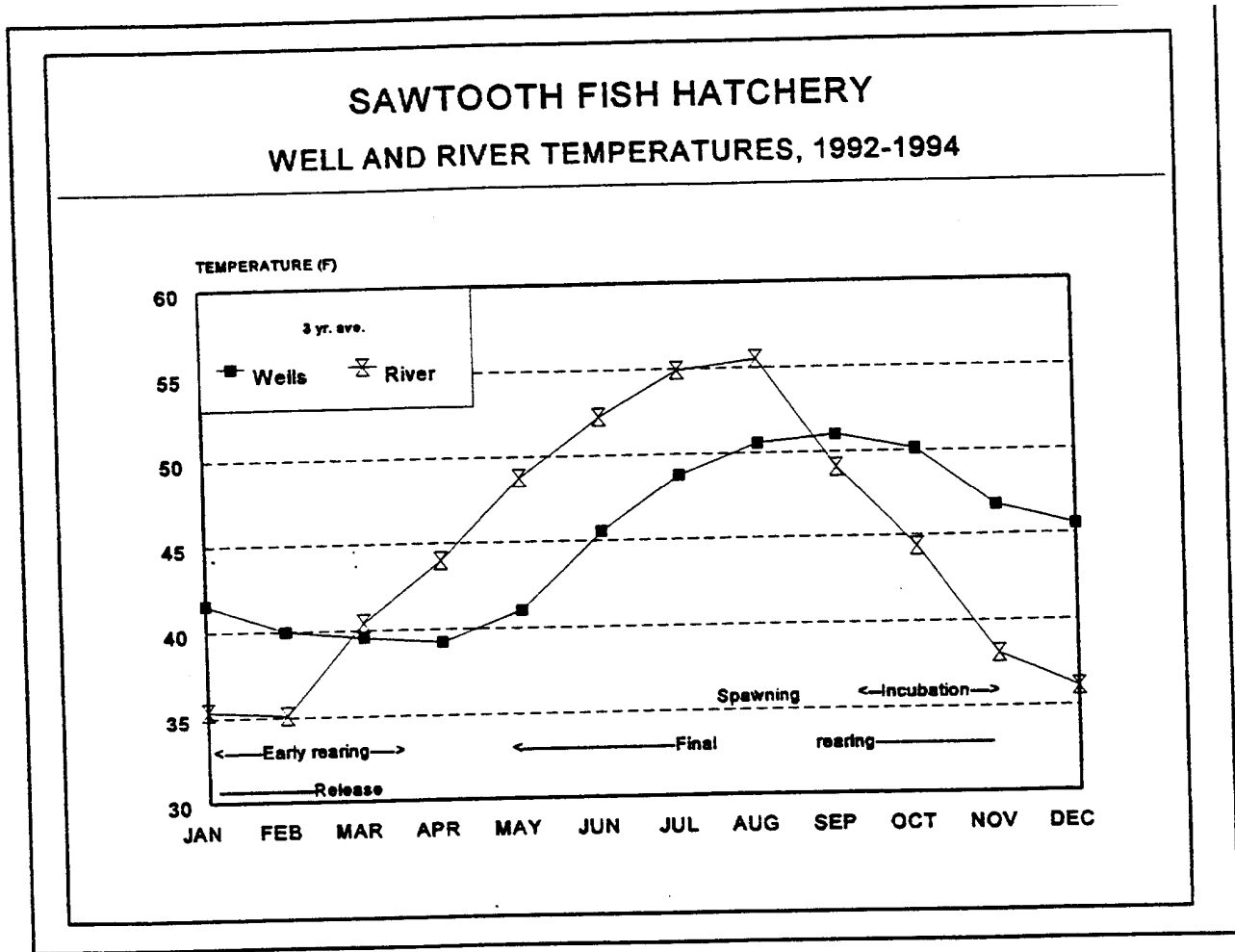
3 yr. old: ≤ 64 cm

4 yr. old: 64 to 82 cm

5 yr. old: >82 cm

Adult returns include an unknown number of natural fish.

Appendix B. Well and River Water Temperatures at Sawtooth Fish Hatchery for 1992-1994.



Appendix C. Water Quality Analysis of the Salmon River.

<b>Nutrients (mg/L)</b>	<b>1992</b>	<b>1985</b>
T. Ammonia as N	0.043	0.045
T. NO <sub>2</sub> + NO <sub>3</sub> as N	0.073	0.088
T. Kjeldahl Nitrogen as N	<.05	0.26
T. Phosphorus as P	<.05	0.02
Ortho Phosphate as P	0.019	<.003
<b><u>Minerals (mg/L)</u></b>		
Sp. Conductance (umhos/cm)	157	135
Hardness as CaCO <sub>3</sub>	68	62
T. Alkalinity as CaCO <sub>3</sub>	74	63
Bicarbonate Alk. as CaCO <sub>3</sub>	74	63
Calcium	24	20.8
Magnesium	1.9	1.8
Sodium	7.0	3.8
Potassium	0.7	<1
Fluoride	0.85	0.58
Sulphate as SO <sub>4</sub>	5	<6
<b><u>Total Metals(ug/L)</u></b>		
Arsenic, Total	<10	<10
Boron, Total	<80	1
Cadmium, Total	<1	<1
Chromium, +6	<10	<50
Chromium, Total	<10	<50
Copper, Total	<10	<10
Iron, Total	20	120
Lead, Total	<5	<50
Manganese, Total	<10	10
Mercury, Total	<.5	<.5
Nickel, Total	<10	<50
Silver, Total	<1	<1
Zinc, Total	<2	<1
<b><u>Miscellaneous</u></b>		
Turbidity (NTU)	<1	1.8
pH (SU)	8.0	8.1
Total Cyanide (mg/L)	<.005	<.005
Total Residue	-	97

# Appendix D. Results of Disease Sampling.

## BY 92 juvenile chinook

Case #	Stock	Date	Data
93-39	Saw	02/08/93	viro 0/10
93-204	EF	05/13/93	viro 0/10, BKD (FAT) 0/10
93-205	Saw	05/13/93	viro 0/10, BKD (FAT) 0/10
93-248	Saw	06/10/93	viro 0/10, BKD (FAT) 0/12
93-249	EF	06/10/93	viro 0/10, BKD (FAT) 0/12
93-278	Saw	07/12/93	BKD (FAT) 0/10, Bact 3/8 <u>A. sobrina</u>
93-279	EF	07/12/93	BKD (FAT) 0/10, Bact 2/8 <u>A. sobrina</u>
93-297	Saw	07/12/93	Bact 2/4 <u>A. hydrophila</u>
93-344	Saw	07/12/93	EIBS 0/8
93-298	EF	07/25/93	Bact 2/4 <u>A. hydrophila</u>
93-313	EF	08/06/93	viro 0/10, BKD (FAT) 0/10
93-314	Saw	08/06/93	viro 0/10, BKD (FAT) 0/10
93-525	Saw	10/27/93	viro 0/10, BKD (FAT) 0/10, Elisa 0/10
93-528	Saw	10/28/93	BKD (FAT) 0/20, Elisa 0/20
93-529	Saw	10/28/93	BKD (FAT) 0/20, Elisa 0/20
93-530	Saw	10/28/93	EIBS 0/5
93-559	Saw	11/18/93	<u>Saprolegnia parasitia</u>
93-594	Saw	12/15/93	viro 0/30, BKD (FAT) 0/30, Elisa 0/30
			Bact 0/24
94-128	EF	03/16/94	viro 0/20, Elisa 3/3
94-129	Saw	03/16/94	viro 0/20, Elisa 4/4

## Return year 92 chinook brood stock

92-304	EF	08/06/92	Elisa 3/3
92-305	Saw	08/06/92	Elisa 5/5
92-309	Saw	08/10/92	Elisa 4/6, IHN 0/6, IPN 0/6
92-310	EF	08/10/92	Elisa 1/1, IHN 0/1, IPN 0/1
92-315	Saw	08/13/92	Elisa 2/3, IHN 0/3, IPN 0/3
92-320	Saw	08/17/92	Elisa 2/2, IHN 0/2, IPN 0/2
92-321	EF	08/17/92	Elisa 7/12, IHN 0/2, IPN 0/2
92-332	Saw	08/20/92	Elisa 12/13, IHN 0/13, IPN 0/13
92-342	EF	08/24/92	Elisa 1/1, IHN 0/1, IPN 0/1
92-343	Saw	08/24/92	Elisa 4/8, IHN 0/8, IPN 0/8
92-344	Saw	08/20/92	Elisa 6/20
92-349	Saw	08/27/92	Elisa 11/33, IHN 0/33, IPN 0/33
92-353	Saw	08/31/92	Elisa 9/47
92-355	EF	08/27/92	Elisa 2/2, IHN 0/1, IPN 0/1
92-367	Saw	09/03/92	Elisa 4/10
92-382	EF	09/04/92	Elisa 0/1
92-383	Saw	09/08/92	Elisa 6/14
92-385	Saw	09/10/92	Elisa 8/71
92-396	EF	09/09/92	Elisa 0/12

Appendix D (Continued). Results of disease sampling.

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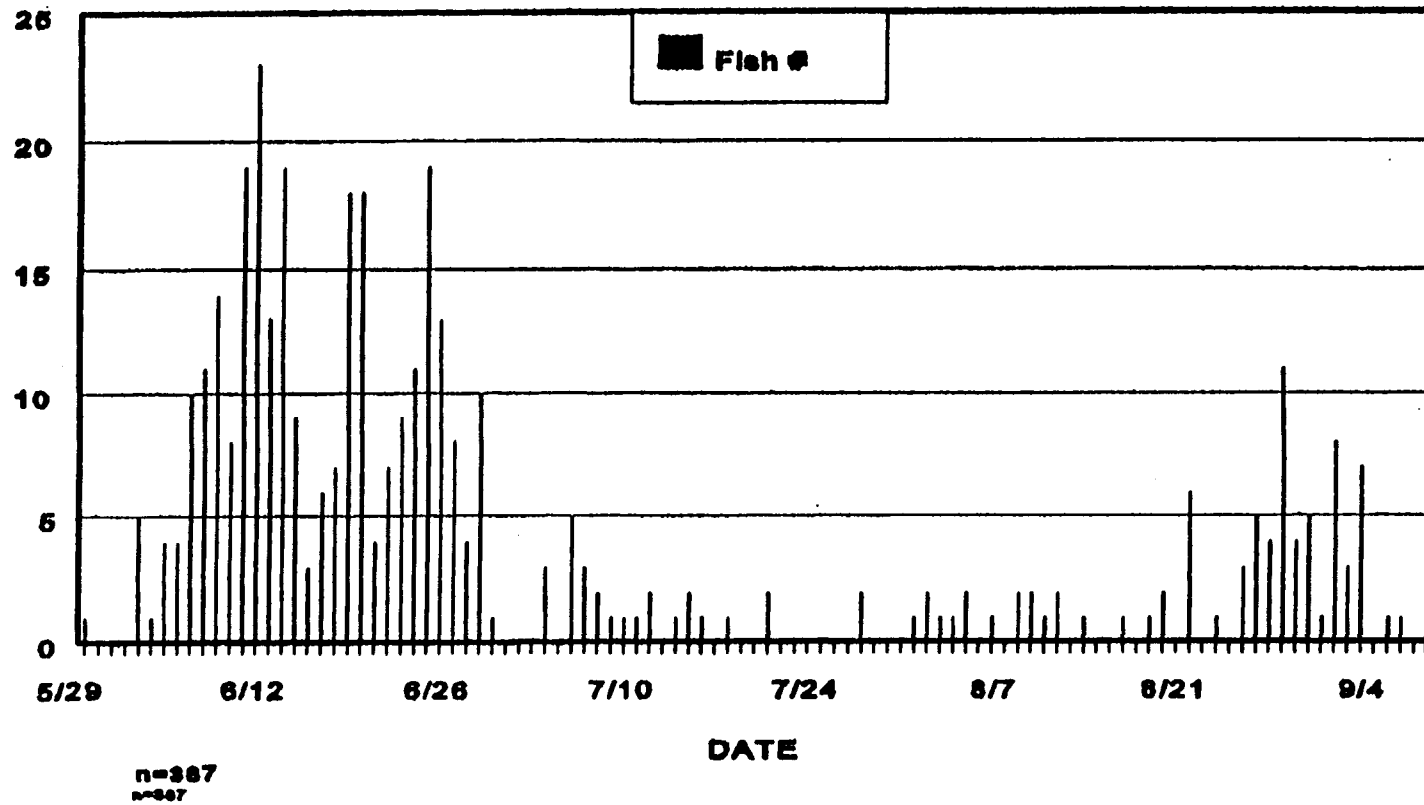
**Return year 93 steelhead brood stock**

Case #	Stock	Date	Data
93-101	Saw	04/06/93	viro 0/9
93-115	EF	04/09/93	viro 0/4
93-118	Saw	04/09/93	viro 0/19
93-132	Saw	04/13/93	viro 0/19
93-146	Saw	04/16/93	viro 0/28
93-148	EF	04/16/93	viro 0/19
93-160	Saw	04/20/93	viro 0/27
93-161	EF	04/20/93	viro 0/12
93-165	Saw	04/23/93	viro 0/48
93-175	Saw	04/27/93	viro 0/62
93-176	EF	04/27/93	viro 0/4
93-182	EF	04/30/94	viro 0/7
93-188	Saw	05/04/93	viro 0/15
93-191	Saw	05/07/93	viro 0/9
93-199	EF	05/10/93	viro 0/2, WD 2/2
93-201	Saw	05/11/93	viro 0/25

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Appendix E. Sawtooth Fish Hatchery Spring Chinook Salmon Run Timing, 1992.

## SAWTOOTH RUN TIMING



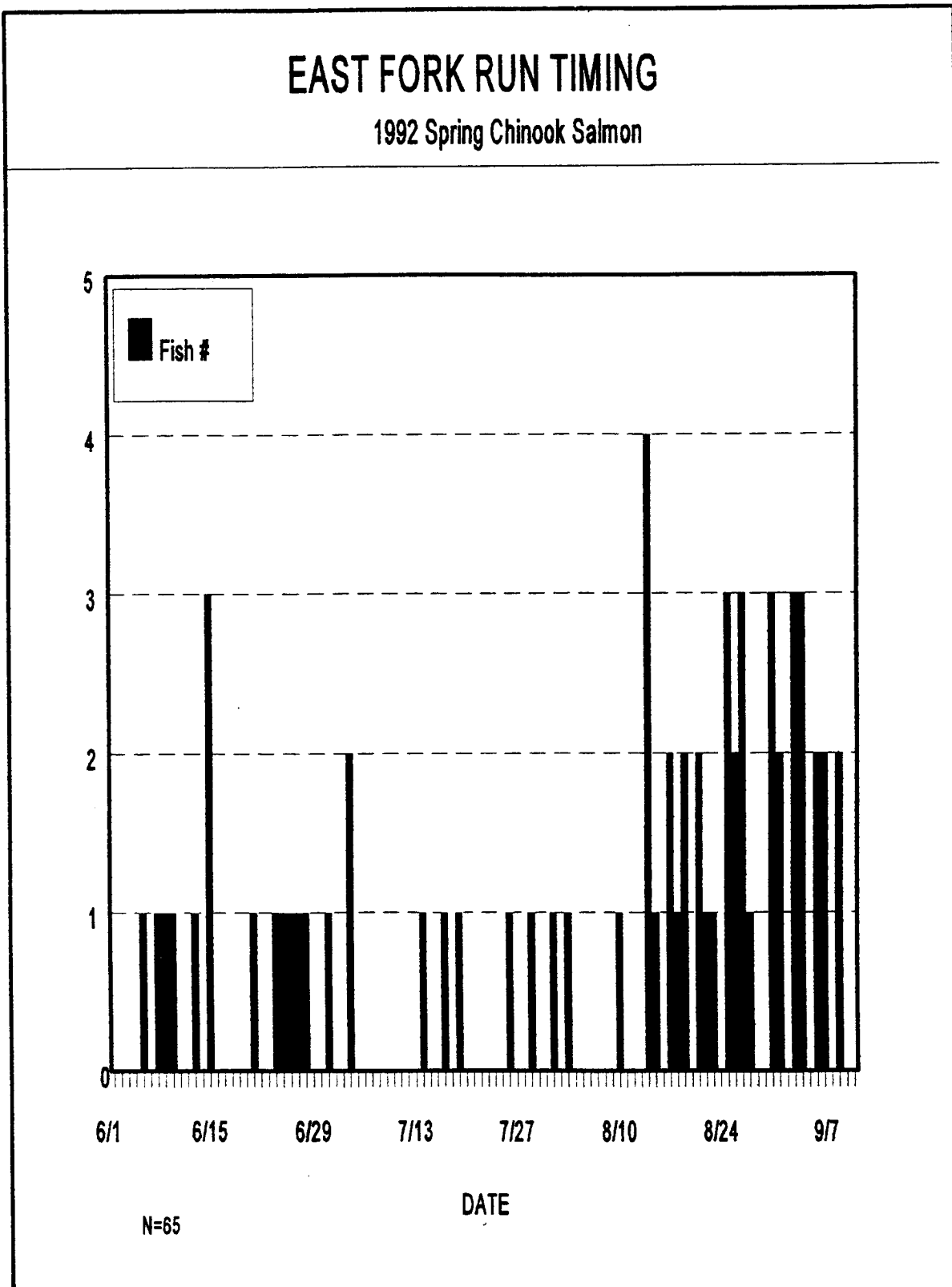
Appendix F. Age Class Totals from All Trapped Chinook, Return Year 1992.

Sawtooth	Length (Fk)	Year class	Number
Males	≤ 64 cm	3 year old	26
	64-82 cm	4 year old	153
	> 82 cm	5 year old	43
Females	≤ 64 cm	3 year old	3
	64-82 cm	4 year old	79
	> 82 cm	5 year old	<u>83</u>
Total			387
<u>East Fork</u>			
Males	≤ 64 cm	3 year old	14
	64-82 cm	4 year old	22
	> 82 cm	5 year old	16
Females	≤ 64 cm	3 year old	1
	64-82 cm	4 year old	5
	> 82 cm	5 year old	<u>7</u>
Total			65



Appendix G. Age Class Breakdown by Released Chinook, Return Year 1992.

<u>Sawtooth</u>	<u>Length (Fk)</u>	<u>Year class</u>	<u>Number</u>
Males	≤ 64 cm	3 year old	12
	64-82 cm	4 year old	56
	> 82 cm	5 year old	21
Females	≤ 82 cm	4 year old	24
	> 82 cm	5 year old	<u>32</u>
Total			145
<u>East Fork</u>			
Males	≤ 64 cm	3 year old	9
	64-82 cm	4 year old	16
	> 82 cm	5 year old	9
Females	≤ 82 cm	4 year old	3
	> 82 cm	5 year old	<u>3</u>
Total			40



Appendix I. Survival table for chinook (BY 92) and steelhead (BY 93) from green eggs to released smolts, at Sawtooth and East Fork sites.

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**CHINOOK**

Green egg number	Eyed egg number	Percent survival	Released smolts	Percent survival from green
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**Sawtooth Fish**

468,300	423,600	90.5	213,830	45.7
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**East Fork Fish**

30,500	28,200	92.4	12,368	40.6
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498,800	451,800		226,198	
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**STEELHEAD**

Green egg number	Eyed egg number	Percent survival	Released smolts	Percent survival from green
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**Sawtooth Fish**

1,131, 877	1,031,635	91.1	954,456	84.3
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**East Fork Fish**

211,993	178,925	84.4	160,040	75.5
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1,343, 870	1,210,560		1,114,496	
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<sup>a</sup> All steelhead raised at other hatcheries.

Appendix J. Feed Schedule for Sawtooth Hatchery SC. BY92.

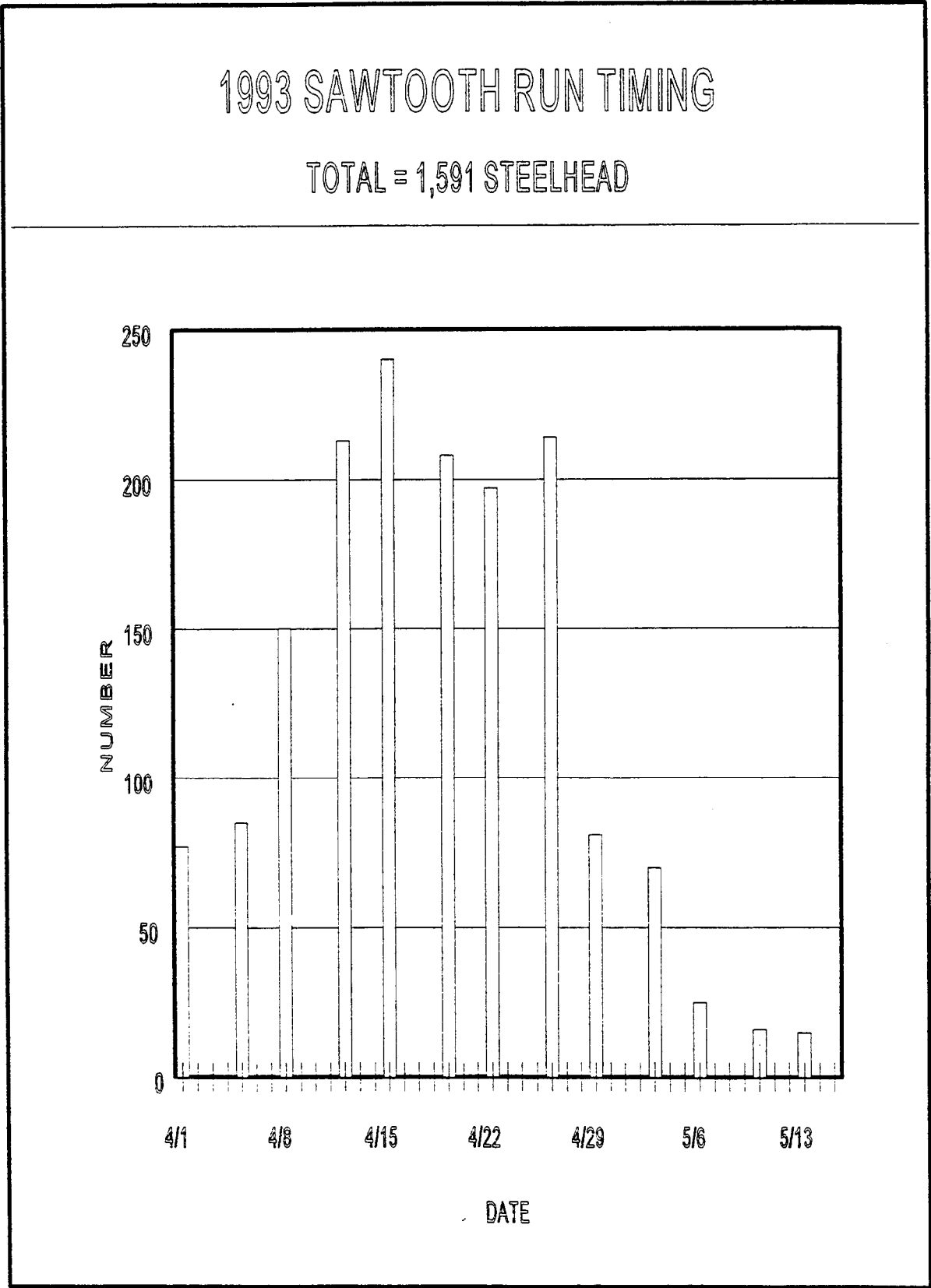
fpp	%bw fed	time span	
swim-up - 800	.035	12/15/91	- 01/15/92
800 - 500	.033	01/16	- 02/28
500 - 400	.028	03/01	- 03/15
400 - 350	.025	03/16	- 03/24
350 - 300	.023	03/25	- 04/01
300 - 250	.02	04/02	- 04/14
250 - 150	.022	04/15	- 06/01
150 - 110	.024	06/02	- 06/28
110 - 90	.028	06/29	- 07/04
90 - 50	.03	07/05	- 08/15
50 - 25	.028	08/16	- 09/25
25 - 21	.024	09/26	- 10/15
≤ 25	maintenance	10/15	- release

Appendix K. Summary of Marked Chinook Released Return Year 1992.

Total Supplementation Release	72,300
Total Sawtooth Weir Release	141,530
Total East Fork Release	12,368
CWT plus PIT-tags	1,996
Left Ventral Clip plus PIT-tags	562
Right Ventral Clip plus PIT-tags	372
Ad-clip only plus PIT-tags	<u>340</u>
Total Release	226,198

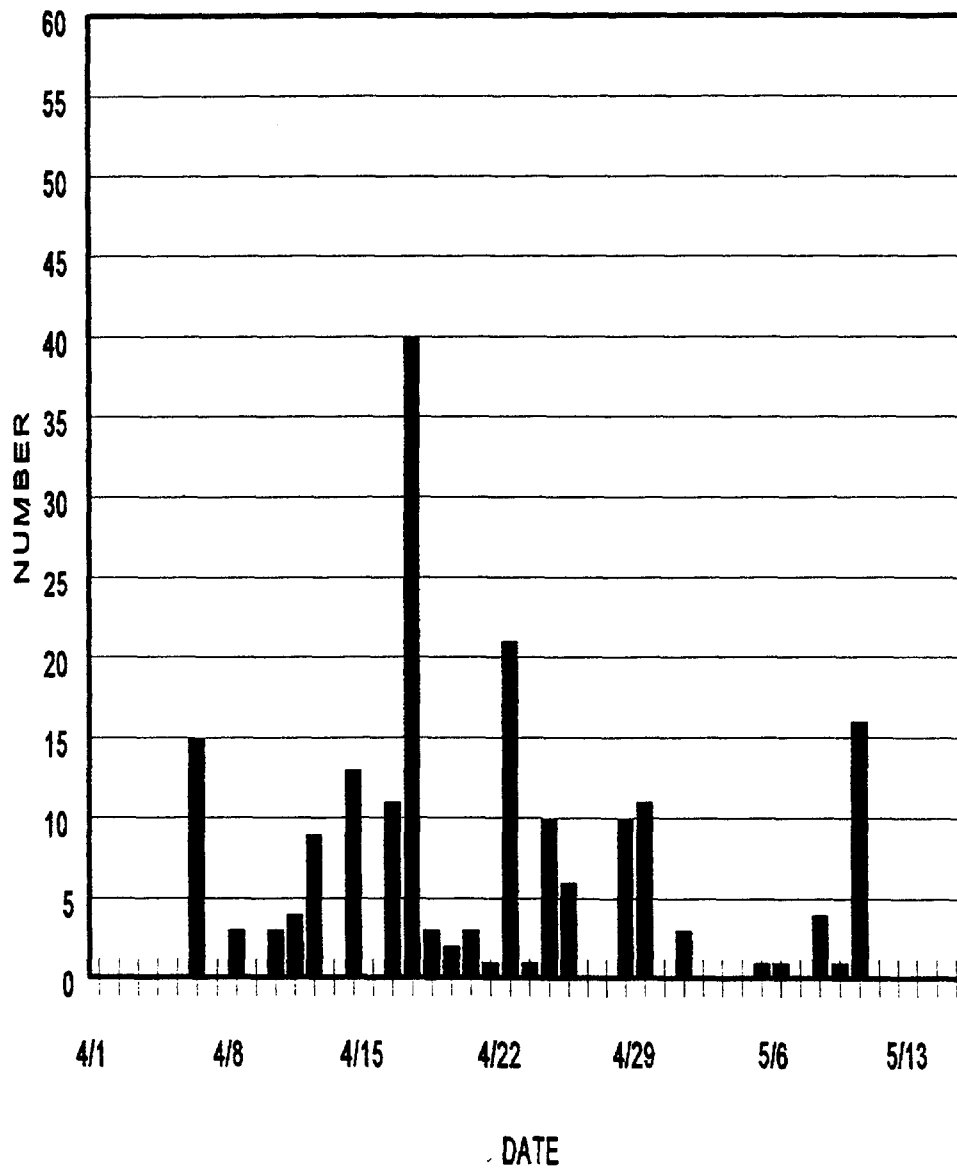
Appendix L. Summary of smolt releases and marks.

Steelhead						
<b>Sawtooth Stock - All fish reared by Hagerman National Hatchery</b>						
Release Date	Number	Marks-CWT	# PIT	fpp	Release Site	Purpose
4/29/94	60,929	LV-10-46-29	300	4.6	Saw weir	Acclimation
4/29/94	650,123	ad-clipped	0	4.6	Saw weir	Acclimation
4/29/94	60,772	LV-10-46-28	302	4.7	Saw weir	Direct Release
4/11/94	<u>61,817</u>	LV-10-49-26	0	4.6	S.R./Bruno	Contribution
Total	833,641					
<b>East Fork Stock - All fish reared by Magic Valley Hatchery</b>						
4/12/94	20,774	LV-10-47-11	100	4.8	Upper EF	Contribution
4/13/94	21,562	LV-10-47-12	100	4.8	Upper EF	Contribution
4/15/94	21,343	LV-10-47-13	100	4.8	Upper EF	Contribution
4/12/94	96,381	Ad-clipped	0	4.8	Upper EF	Contribution
Total	160,060					
<b>Summary of BY94 spring chinook salmon smolt releases and marks.</b>						
Mark Type	CWT Code	# PIT	Number of Fish Released	Release Site	Release Date	Purpose
Ad	None	340	21,864	SFH weir	04/13/94	BKD study
RV	None	372	12,368	Upper EF	04/08/94	E.Fork ID
LV	None	263	72,300	Upper SR	04/09/94	Supplementation
Ad	10-49-27	357	23,388	SFH weir	04/09-13/94	Nat. Rearing #1
Ad	10-49-28	325	21,336	SFH weir	04/09-13/94	Nat. Rearing
Ad	10-49-29	357	23,750	SFH weir	04/09-13/94	Control 2
Ad	10-46-04	249	9,052	SFH weir	04/09-13/94	
Ad	10-46-12		9,080	SFH weir	04/09-13/94	
Ad	10-49-30	378	24,297	SFH weir	04/09-13/94	Nat. Rearing
Ad	10-46-05	325	6,560	SFH weir	04/09-13/94	Nat. Rearing
Ad	10-46-11		2,203	SFH weir	04/09-13/94	Nat. Rearing
Totals		3,267	226,198			



# 1993 EAST FORK RUN TIMING

TOTAL = 176 STEELHEAD



Appendix O. Steelhead Returns by Year Class and Sex, Return Year 1993.

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Sawtooth

2 year old males - - - - 1,010

3 or 4 year old males - - 144

1,154 males

2 year old females - - - - 332

3 or 4 year old females - - 105

437 females

East Fork

2 year old males - - - - 62

3 or 4 year old males - - 37

99 males

2 year old females - - - 3

3 or 4 year old females - - 74

77 females

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These figures are based on Kent Ball's criteria for aging steelhead, as described in Appendix T

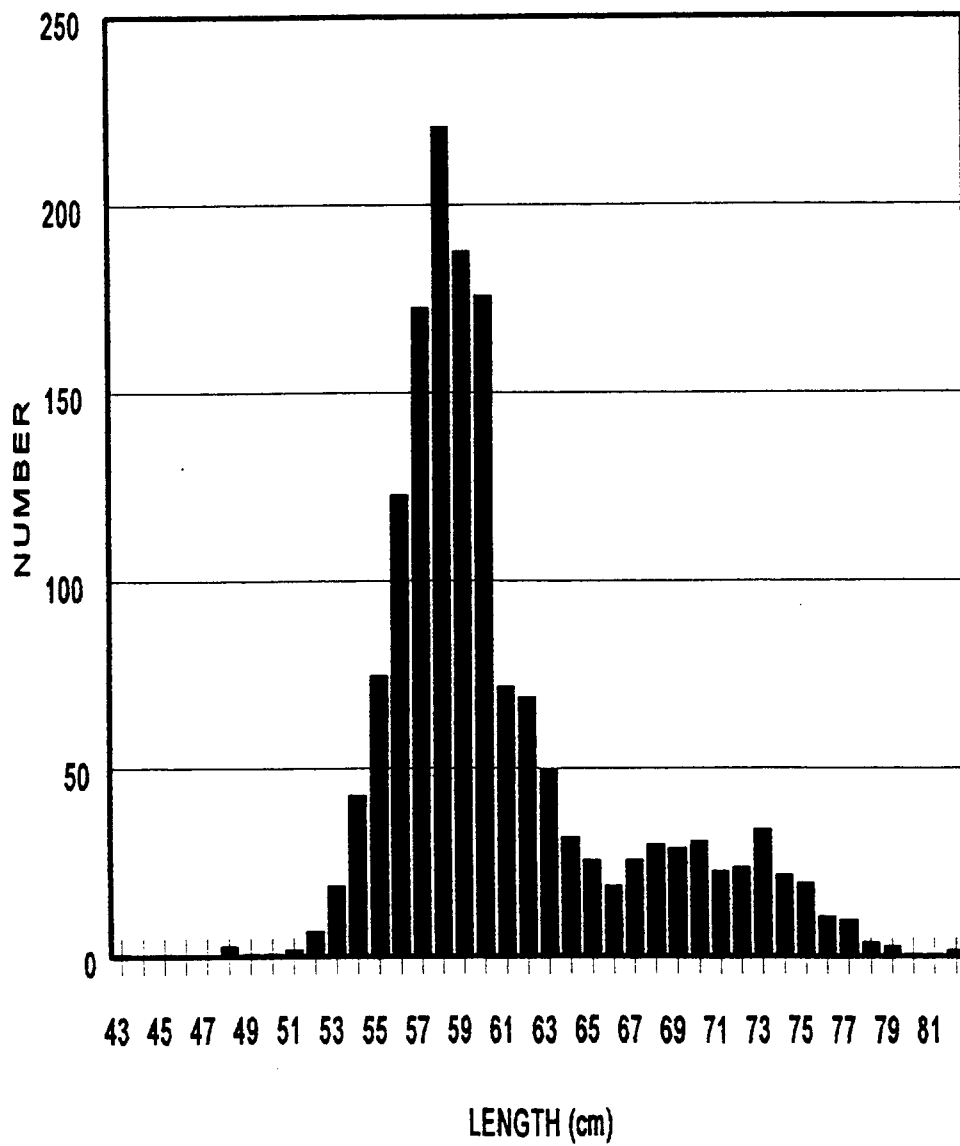


Appendix P. Sawtooth steelhead length frequency distribution, return year 1993.

Length (cm)	Hatchery Males	Natural Males	Hatchery Females	Natural Females	Total
43	1				1
45	1				1
48	3				3
49	1				1
50	1				1
51	1		1		2
52	6		1		7
53	17		2		19
54	36		7		43
55	57		18		75
56	86		37		123
57	124		49		173
58	154		67		221
59	138		50		188
60	134		42		176
61	66		24		90
62	60		9		69
63	42		8		50
64	25		7		32
65	16		9	1	26
66	13		6		19
67	13		13		26
68	15		14	1	30
69	16	1	12		29
70	18		12	1	31
71	16		7		23
72	15	1	8		24
73	21	1	12		34
74	14		8		22
75	17		2	1	20
76	7		4		11
77	7		3		10
78	4				4
79	3				3
80	1				1
81	1				1
82	<u>1</u>	<u>—</u>	<u>1</u>	<u>—</u>	<u>2</u>
Totals	1,151	3	433	4	1,591

# 1993 SAWTOOTH STEELHEAD

LENGTH FREQUENCY (male and female, n=1,591)

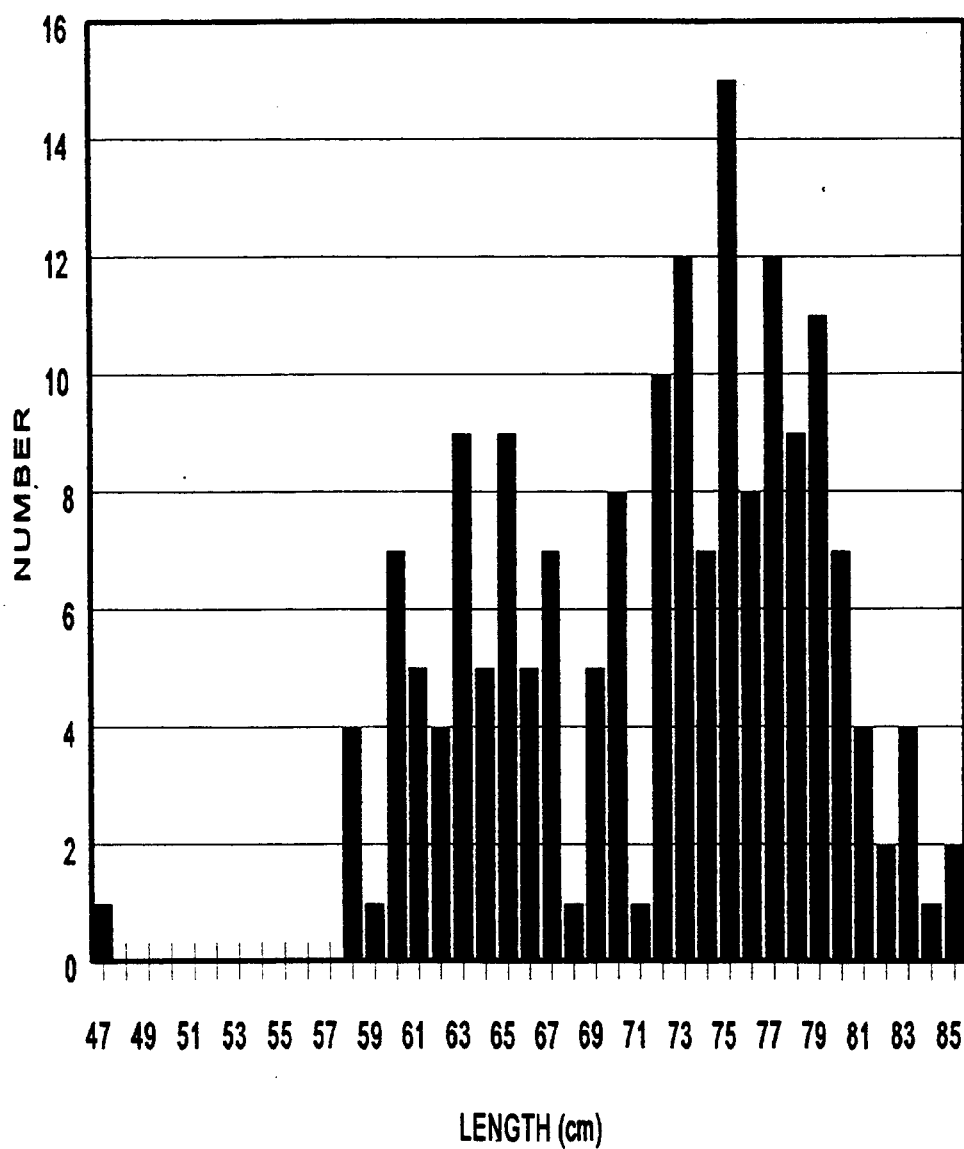


Appendix R. East Fork steelhead length frequency distribution, return year 1993.

Length (cm)	Hatchery Males	Natural Males	Hatchery Females	Natural Females	Total
47		1			1
58	4				4
59	1				1
60	7				7
61	4	1			5
62	4				4
63	8			1	9
64	5				5
65	7	1	1		9
66	5				5
67	6		1		7
68	1				1
69			5		5
70	1		6	1	8
71	1				1
72	1	1	6	2	10
73	2	1	8	1	12
74	2	1	4		7
75	4		9	2	15
76	1		5	2	8
77	9		3		12
78	5		4		9
79	3	1	7		11
80	4		3		7
81	1		3		4
82	1		1		2
83	3		1		4
84	1				1
85	—	<u>1</u>	<u>1</u>	—	<u>2</u>
Totals	91	8	68	9	176

# 1993 EAST FORK STEELHEAD

LENGTH FREQUENCY (males and females, n= 176)



Appendix T. Criteria for Aging Steelhead, from Kent Ball, IDFG.

<b>"A" male</b>	≤68 cm -	2 year old
	>68 cm -	3 or 4 year old
<b>"A" female</b>	≤65 cm -	2 year old
	>65 cm -	3 or 4 year old
<b>"B" male</b>	≤73 cm -	2 year old
	>73 cm -	3 or 4 year old
<b>"B" female</b>	≤68 cm -	2 year old
	>68 cm -	3 or 4 year old

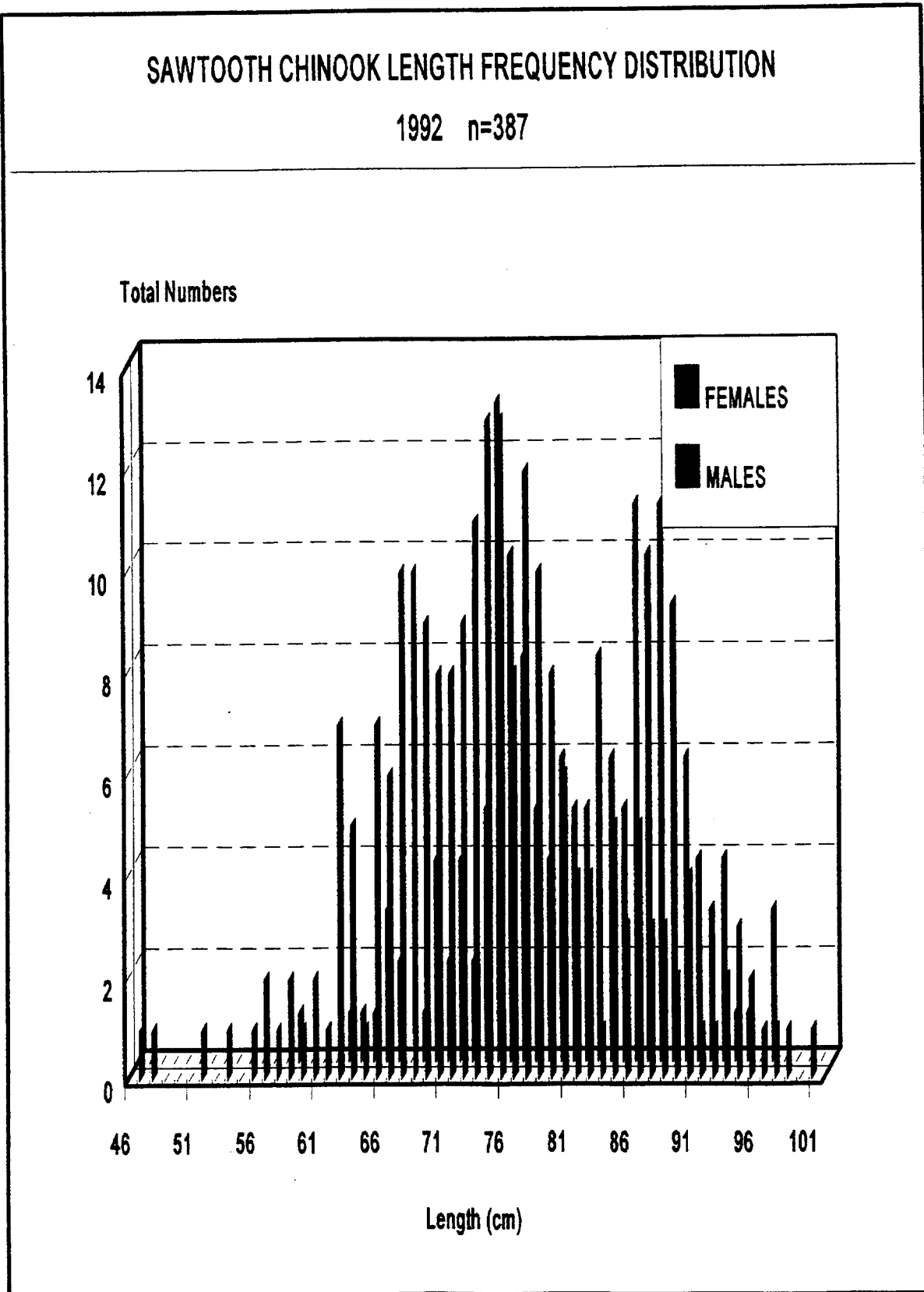
Appendix U. Released Steelhead by Year Class and Sex, Return Year 1993.

<b><u>Sawtooth</u></b>					
<b>Males</b>	2 year old	424	<b>Females</b>	2 year old	137
	3 or 4 year old	<u>66</u>		3 or 4 year old	<u>41</u>
	Total	490		Total	178
<b><u>East Fork</u></b>					
<b>Males</b>	2 year old	25	<b>Females</b>	2 year old	3
	3 or 4 year old	<u>17</u>		3 or 4 year old	<u>31</u>
	Total	42		Total	34

## Appendix V. Production cost table (includes chinook BY 92 and steelhead BY 93).

Number	Lbs. feed	Cost feed	Lb of smolts	C	Total cost	Cost per 1,000	Cost per lb.
<u>Chinook</u>							
Sawtooth							
454,300	27,771	\$16,821	8,854	3.3	\$235,600	\$1,100	\$27.52
East Fork							
27,700	1,772	\$1,073	565	3.2	\$58,900	\$2,103	\$117.80
Steelhead							
	Green Eggs	Eyed Eggs	Total Cost	Cost per 1,000 eyed eggs			
Sawtooth							
	1,131,877	1,031,635	\$34,095	\$ 33.06			
East Fork							
	211,993	178,925	24,354	\$136.82			
Pahsimeroi							
	4,729,711	4,211,087	38.966	\$ 9.25			
Totals	6,073,581	5,421,647	\$97,415	\$179.13			

Note. Total costs less capital outlay



Appendix X. Lengths of brood year 1992 spring chinook salmon trapped at Sawtooth FH.

Fork length (cm)	Males	Female
47	1	0
48	1	0
49	0	0
50	0	0
51	0	0
52	1	0
53	0	0
54	1	0
55	0	0
56	1	0
57	2	0
58	1	0
60	1	0
61	2	0
62	1	0
63	5	1
65	1	1
66	7	3
67	6	2
68	10	0
69	10	1
70	9	4
71	8	2
72	8	4
73	9	2
74	11	5
75	13	13
76	13	10
77	8	8
78	12	5
79	10	4
80	8	6
81	6	5
82	4	5
83	4	8
84	1	6
85	3	11
87	5	10
88	3	11
89	3	9
90	2	6
91	4	4
92	1	3
93	1	2
94	2	1
95	3	1
96	2	0
97	1	3
98	1	0
99	1	0
100	0	0
101	1	0
Total measured	222	165



Appendix Y. Lengths of brood year 1992 spring chinook salmon spawned at Sawtooth FH.

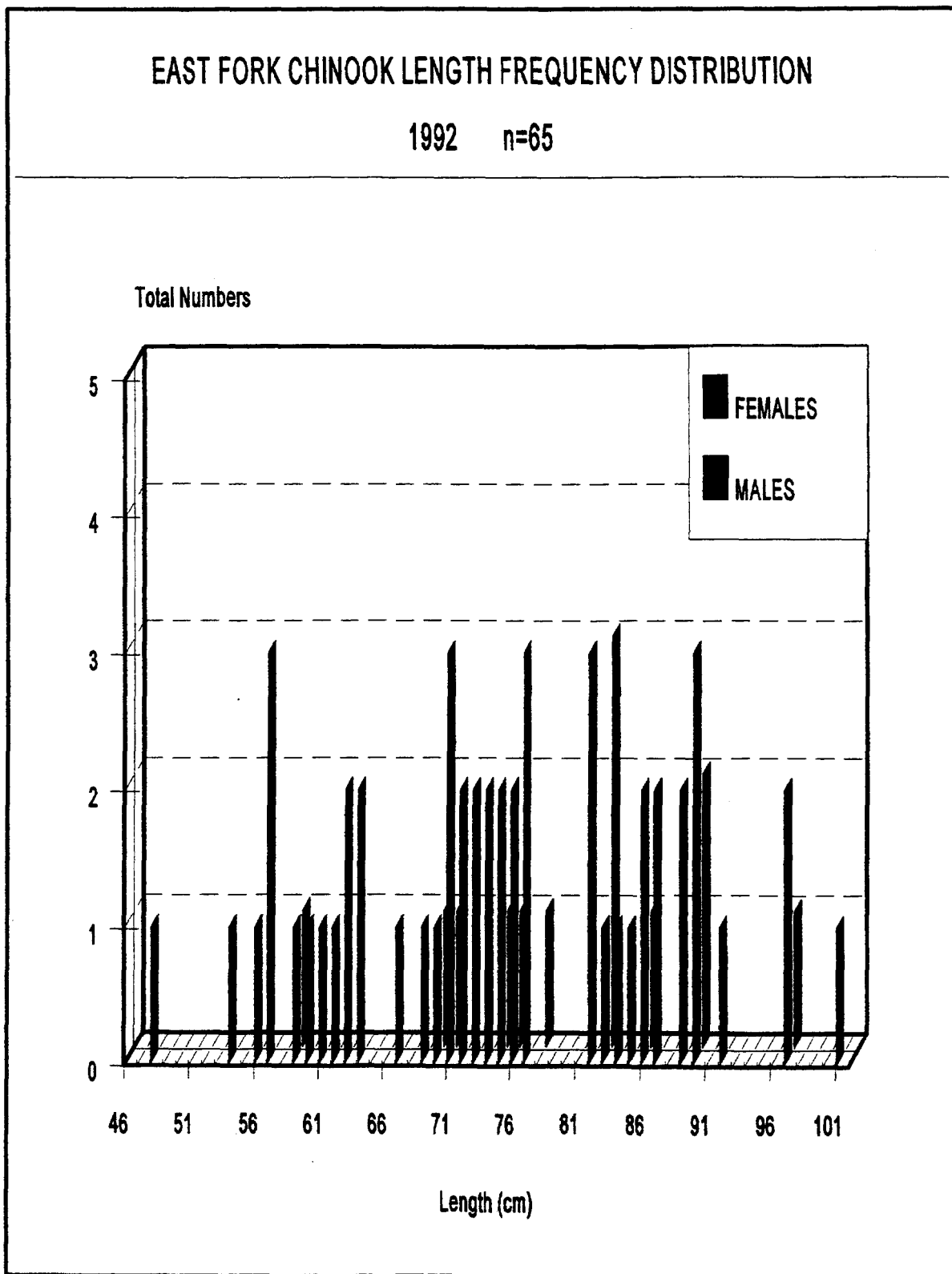
Fork length

(cm)	Males	Female
47	1	0
48	0	0
49	0	0
50	0	0
51	0	0
52	0	0
53	0	0
54	0	0
55	0	0
56	0	0
57	2	0
58	0	0
59	1	1
60	1	0
61	1	0
62	1	0
63	4	1
66	0	1
67	3	3
68	4	1
69	6	0
70	6	1
71	3	3
72	4	1
73	6	3
74	12	4
75	6	11
76	11	4
77	5	7
78	10	3
79	4	2
80	2	5
81	3	2
82	1	2
83	1	6
84	1	2
85	3	3
87	3	6
88	0	5
89	3	7
90	2	5
91	1	3
92	1	2
93	0	2
94	0	3
95	3	1
96	1	0
97	0	2
98	1	0
99	1	0
100	0	0
101	1	0
Total measured	117	104

Appendix Z. Lengths of brood year 1992 spring chinook salmon released at Sawtooth FH.

Fork length		Males	Females
	(cm)		
	47	0	0
	48	1	0
	49	0	0
	50	0	0
	51	0	0
	52	1	0
	53	0	0
	54	1	0
	55	0	0
	56	1	0
	57	0	0
	58	1	0
	59	1	0
	60	0	0
	61	1	0
	62	0	0
	63	3	0
	64	2	0
	65	1	0
	66	3	0
	67	2	1
	68	3	0
	69	5	0
	70	5	1
	71	3	1
	73	4	0
	74	1	0
	75	5	3
	76	3	6
	77	3	1
	78	3	2
	79	3	2
	80	3	1
	81	3	3
	82	3	3
	84	0	4
	85	3	2
	86	0	5
	87	5	4
	88	0	4
	89	1	3
	90	2	3
	91	2	2
	92	0	1
	93	1	1
	94	2	0
	95	0	0
	96	1	0
	97	1	1
	98	0	0
	99	0	0
	100	0	0
	101	0	0
Total measured		89	56

Appendix AA. East Fork Chinook Length Frequency Distribution, 1992.

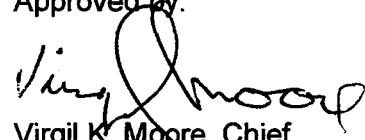


Submitted by:

Brent R. Snyder  
Fish Hatchery Manager I

Phil Coonts  
Assistant Fish Hatchery Manager

Approved by:

A handwritten signature in black ink, appearing to read "Virgil K. Moore". The signature is fluid and cursive, with the first name "Virgil" being more prominent.

Virgil K. Moore, Chief  
Bureau of Fisheries

A handwritten signature in black ink, appearing to read "Tom Rogers". The signature is fluid and cursive, with the first name "Tom" being more prominent.

Tom Rogers  
Fish Hatcheries Supervisor